



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,511	06/29/2001	Ted Liang	042390P11354	8234
7590 01/25/2008 Michael A. Bernadicou BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP Seventh Floor 12400 Wilshire Boulevard Los Angeles, CA 90025-1026			EXAMINER ZERVIGON, RUDY	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 01/25/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/895,511	<b>Applicant(s)</b> LIANG ET AL.	
	<b>Examiner</b> Rudy Zervigon	<b>Art Unit</b> 1792	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 November 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-12 and 18-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-12 and 18-33 is/are rejected.
- 7) ☒ Claim(s) 19 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 19, 24 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form.

### ***Claim Rejections - 35 USC § 103***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 4-12, 18-20, 25, and 27-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Casey, Jr. et al (USPat. 6,042,738) as demonstrated by Baum, Aaron Wolf et al (US 5,684,360 A) in view of Parker; Norman W. et al. (US 4,818,872 A) and Fuji, Eiji et al (US 5,876,504 A).

Casey teaches an apparatus (Figure 1) including:

- i. A holder (26) to mount a substrate / mask (30) in a chamber (22) by a stage (24) disposed below said holder (26) – Regarding the particular identity of the article to be processed, it is well established that apparatus claims must be structurally distinguished from the prior art (In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does ." (emphasis in original) Hewlett - Packard Co . v. Bausch & Lomb Inc ., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990), MPEP – 2114). Further, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art

apparatus” if the prior art apparatus teaches all the structural limitations of the claim.

Exparte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

- ii. A stage (24) adapted to position the holder in a chamber (22), and adapted to move in different directions (column 4, line 64 – column 5, line 3)
- iii. A pumping system (“vacuum chamber 22”; column 4, lines 31) adapted to evacuate the chamber (22)
- iv. A first electron column<sup>1</sup> imaging system (28, 54; column 4, lines 38-45; column 5, lines 5-10; Figure 1; column 3, lines 8-16, “image and mill the workpiece” to locate an opaque defect; column 4, lines 5-10; column 5, lines 5-10) in said chamber (22, see lines encompassing 54,28) and disposed vertically above (28) said holder (26) and over an opaque defect (column 3, lines 60-65) on said substrate (90; Figure 1)
- v. A gas delivery system (45, 34; column 5, lines 22-38) comprising a nozzle (45; Figure 1) disposed over said opaque defect at a tilt angle of 45-70 degrees (see Figure 1) from the vertical, to dispense a reactant gas (out of 45; Figure 1) and a carrier gas from a reservoir (36)
- vi. A second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) disposed at an angle (32 is at an angle offset from the vertical) over said holder and said opaque defect (column 3, lines 60-65) to direct electrons towards said reactant gas (out of 45; Figure 1) “bombardment, and without ion implantation or knock-on of atoms” – “methods of gas-assisted etching using an etching gas including bromine” (abstract) – claim 1, 25. It is noted that when the

structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

- vii. DUV/EUV mask / substrate (column 1, lines 35-45)
- viii. Chrome opaque defect (column 3, lines 3-4; line 55)
- ix. An ion focusing control system (18; column 4, lines 28-44) and scanning control system (62, column 4, lines 39-43) – claim 9
- x. An acceleration system (“JEOL Model 6400”) providing a low acceleration voltage (column 9, lines 20-25) – claim 11
- xi. A computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) adapted to control the second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) – claim 10, 12.
- xii. The gas delivery system (34; column 5, lines 22-38) is also adapted to “dispense a carrier gas towards said opaque defect”, “said gas comprises water or oxygen” (claim 29), “said gas comprises Xenon Fluoride (XeF<sub>2</sub>)” (claim 30) – Applicant’s claim 18, 29, 30 limitations are intended use claim requirements. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably

---

<sup>1</sup> Baum, Aaron Wolf et al (US 5,684,360 A) teaches the art-accepted definition of “electron beam column” (column

distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- xiii. Applicant's claim 20 limitation of "the reactant gas absorbs to said opaque defect and becomes disassociated" are intended use claim requirements. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Casey does not teach that Casey's first electron column (28; Figure 1; column 3, lines 8-16, "image and mill the workpiece"; column 4, lines 5-10; column 5, lines 5-10) is used to direct a first set of electrons towards a substrate.

Casey does not teach that Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) is capable of "scanning" and direct electrons in a range of 0.3-3.0keV, wherein said electron beam has a tail diameter of 5-125nm and an electron beam size smaller than 30% of the smallest critical defect.

However, the Examiner believes that Applicant's newly added amended claim limitations of "wherein said electron beam has a tail diameter of 5-125nm and an electron beam size smaller

than 30% of the smallest critical defect.” are claim requirements of intended use of the pending apparatus claims. Indeed, the “electron beam size smaller than 30% of the smallest critical defect” is a feature that depends on the “smallest critical defect” of the article that is worked on which is not considered part of the claimed apparatus. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Casey does not teach Casey’s computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) adapted to control the second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) can control Casey’s second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) “dwell time”, “scan rate”, “refresh time”, and “retrace time” because Casey does not teach that Casey’s second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) is capable of “scanning”. However, Casey’s computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) is inherently capable of controlling “dwell time”, “scan rate”, “refresh time”, and “retrace time” as evidenced

from Casey's "scan generator element 62", "dwell registers 64" (column 4, line 40; column 7, line 55 – column 8, line 5), and processor 52/112 "to implement a digital raster pattern" (column 5, line 65). Applicant's claimed "times" and "rates" of moving are translated to Casey's control element 58 to generate raster motions which have "dwell time", "scan rate", "refresh time", and "retrace time" based on the desired milling instructions (column 6, lines 1-10; column 7, lines 45-54).

Casey does not teach that Casey's gas delivery system (45, 34; column 5, lines 22-38) comprising a nozzle (45; Figure 1) with a diameter of 100-300 microns, a distance of 50-150 microns, and an angular dispersion of 5-25 degrees.

Parker teaches a "highly focused" scanning ("ion beam is scanned"; claim 1, ) electron column (4; Figure 1A; column 4; lines 13-23) used to direct a first set of electrons (10; Figure 1A; column 4; lines 13-23) towards a substrate ("targets"; column 2, lines ) for charge neutralization (claim 1, "second, charge neutralization mode").

Fuji teaches a variably positioned gas injection nozzle (8; Figure 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Parker's electron column to Casey's apparatus and to optimize the operation of Casey's apparatus to avoid damaging underlying layers of the processed substrate.

Motivation to add Parker's electron column to Casey's apparatus and to optimize the operation of Casey's apparatus to avoid damaging underlying layers of the processed substrate is to minimize substrate damage as taught by Casey (column 9; lines 65-67) and for combining multiple beam sources into one apparatus as taught by Parker (column 3; lines 29-31) to image "with high spatial resolution" as taught by Parker (column 3; lines 33-35). Further, it is well



established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Casey and Parker's gas injector nozzle with Fuji's variably positioned gas injection nozzle (8; Figure 2).

Motivation to replace Casey and Parker's gas injector nozzle with Fuji's variably positioned gas injection nozzle (8; Figure 2) is for establishing laminar flow on the substrate as taught by Fuji (column 4, lines 35-40).

4. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Casey, Jr. et al (USPat. 6,042,738) as demonstrated by Baum, Aaron Wolf et al (US 5,684,360 A) in view of Parker; Norman W. et al. (US 4,818,872 A).

Casey teaches an apparatus (Figure 1) including:

- i. A holder (26) to mount a substrate / mask (30) in a chamber (22) by a stage (24) disposed below said holder (26) – Regarding the particular identity of the article to be processed, it is well established that apparatus claims must be structurally distinguished from the prior art (In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does ."(emphasis in original) Hewlett - Packard Co . v.

Bausch & Lomb Inc ., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990), MPEP – 2114). Further, a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim.

Exparte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

- ii. A stage (24) adapted to position the holder in a chamber (22), and adapted to move in different directions (column 4, line 64 – column 5, line 3)
- iii. A pumping system (“vacuum chamber 22”; column 4, lines 31) adapted to evacuate the chamber (22)
- iv. A first electron column<sup>2</sup> imaging system (28, 54; column 4, lines 38-45; column 5, lines 5-10; Figure 1; column 3, lines 8-16, “image and mill the workpiece” to locate an opaque defect; column 4, lines 5-10; column 5, lines 5-10) in said chamber (22, see lines encompassing 54,28) and disposed vertically above (28) said holder (26) and over an opaque defect (column 3, lines 60-65) on said substrate (90; Figure 1)
- v. A gas delivery system (45, 34; column 5, lines 22-38) comprising a nozzle (45; Figure 1) disposed over said opaque defect at a tilt angle of 45-70 degrees (see Figure 1) from the vertical, to dispense a reactant gas (out of 45; Figure 1) and a carrier gas from a reservoir (36)
- vi. A second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) disposed at an angle (32 is at an angle offset from the vertical) over said holder and said opaque defect (column 3, lines

60-65) to direct electrons towards said reactant gas (out of 45; Figure 1) “bombardment, and without ion implantation or knock-on of atoms” – “methods of gas-assisted etching using an etching gas including bromine” (abstract) – claim 1, 25. It is noted that when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

- vii. DUV/EUV mask / substrate (column 1, lines 35-45)
- viii. Chrome opaque defect (column 3, lines 3-4; line 55)
- ix. An ion focusing control system (18; column 4, lines 28-44) and scanning control system (62, column 4, lines 39-43) – claim 9
- x. An acceleration system (“JEOL Model 6400”) providing a low acceleration voltage (column 9, lines 20-25) – claim 11
- xi. A computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) adapted to control the second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) – claim 10, 12.
- xii. The gas delivery system (34; column 5, lines 22-38) is also adapted to “dispense a carrier gas towards said opaque defect”, “said gas comprises water or oxygen” (claim 29), “said gas comprises Xenon Fluoride (XeF<sub>2</sub>)” (claim 30) – Applicant’s claim 18, 29, 30 limitations are intended use claim requirements. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally

---

<sup>2</sup> Baum, Aaron Wolf et al (US 5,684,360 A) teaches the art-accepted definition of “electron beam column” (column

will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

- xiii. Applicant's claim 20 limitation of "the reactant gas absorbs to said opaque defect and becomes disassociated" are intended use claim requirements. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Casey does not teach that Casey's first electron column (28; Figure 1; column 3, lines 8-16, "image and mill the workpiece"; column 4, lines 5-10; column 5, lines 5-10) is used to direct a first set of electrons towards a substrate.

Casey does not teach that Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) is capable of "scanning" and electron beam size smaller than 30% of the smallest critical defect. However,

---

6, lines 30-35)

the Examiner believes that Applicant's newly added amended claim limitations of "an electron beam size smaller than 30% of the smallest critical defect." are claim requirements of intended use of the pending apparatus claims. Indeed, the "electron beam size smaller than 30% of the smallest critical defect" is a feature that depends on the "smallest critical defect" of the article that is worked on which is not considered part of the claimed apparatus. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Casey does not teach Casey's computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) adapted to control the second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) can control Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) "dwell time", "scan rate", "refresh time", and "retrace time" because Casey does not teach that Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) is capable of "scanning". However, Casey's computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) is inherently

capable of controlling “dwell time”, “scan rate”, “refresh time”, and “retrace time” as evidenced from Casey’s “scan generator element 62”, “dwell registers 64” (column 4, line 40; column 7, line 55 – column 8, line 5), and processor 52/112 “to implement a digital raster pattern” (column 5, line 65). Applicant’s claimed “times” and “rates” of moving are translated to Casey’s control element 58 to generate raster motions which have “dwell time”, “scan rate”, “refresh time”, and “retrace time” based on the desired milling instructions (column 6, lines 1-10; column 7, lines 45-54).

Parker teaches a “highly focused” scanning (“ion beam is scanned”; claim 1, ) electron column (4; Figure 1A; column 4; lines 13-23) used to direct a first set of electrons (10; Figure 1A; column 4; lines 13-23) towards a substrate (“targets”; column 2, lines ) for charge neutralization (claim 1, “second, charge neutralization mode”).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Parker’s electron column to Casey’s apparatus and to optimize the operation of Casey’s apparatus to avoid damaging underlying layers of the processed substrate.

Motivation to add Parker’s electron column to Casey’s apparatus and to optimize the operation of Casey’s apparatus to avoid damaging underlying layers of the processed substrate is to minimize substrate damage as taught by Casey (column 9; lines 65-67) and for combining multiple beam sources into one apparatus as taught by Parker (column 3; lines 29-31) to image “with high spatial resolution” as taught by Parker (column 3; lines 33-35). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215

(CCPA 1980); *In re Hoeschele* , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc . v. Biocraft Laboratories Inc. ,* 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); *In re Kulling ,* 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

5. Claims 25, and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Casey, Jr. et al* (USPat. 6,042,738) as demonstrated by *Baum, Aaron Wolf et al* (US 5,684,360 A) in view of *Parker; Norman W. et al.* (US 4,818,872 A).

Casey teaches an apparatus (Figure 1) including:

- i. A holder (26) to mount a substrate / mask (30) in a chamber (22) by a stage (24) disposed below said holder (26) – Regarding the particular identity of the article to be processed, it is well established that apparatus claims must be structurally distinguished from the prior art (*In re Danley*, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does ." (emphasis in original) *Hewlett - Packard Co . v. Bausch & Lomb Inc .*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990), MPEP – 2114). Further, a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Exparte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).
- ii. A stage (24) adapted to position the holder in a chamber (22), and adapted to move in different directions (column 4, line 64 – column 5, line 3)
- iii. A pumping system (“vacuum chamber 22”; column 4, lines 31) adapted to evacuate the chamber (22)

- iv. A first electron column<sup>3</sup> imaging system (28, 54; column 4, lines 38-45; column 5, lines 5-10; Figure 1; column 3, lines 8-16, “image and mill the workpiece” to locate an opaque defect; column 4, lines 5-10; column 5, lines 5-10) in said chamber (22, see lines encompassing 54,28) and disposed vertically above (28) said holder (26) and over an opaque defect (column 3, lines 60-65) on said substrate (90; Figure 1)
- v. A gas delivery system (45, 34; column 5, lines 22-38) comprising a nozzle (45; Figure 1) disposed over said opaque defect at a tilt angle of 45-70 degrees (see Figure 1) from the vertical, to dispense a reactant gas (out of 45; Figure 1) and a carrier gas from a reservoir (36)
- vi. A second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) disposed at an angle (32 is at an angle offset from the vertical) over said holder and said opaque defect (column 3, lines 60-65) to direct electrons towards said reactant gas (out of 45; Figure 1) “bombardment, and without ion implantation or knock-on of atoms” – “methods of gas-assisted etching using an etching gas including bromine” (abstract) – claim 1, 25. It is noted that when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).
- vii. DUV/EUV mask / substrate (column 1, lines 35-45)
- viii. Chrome opaque defect (column 3, lines 3-4; line 55)

---

<sup>3</sup> Baum, Aaron Wolf et al (US 5,684,360 A) teaches the art-accepted definition of “electron beam column” (column 6, lines 30-35)



- ix. An ion focusing control system (18; column 4, lines 28-44) and scanning control system (62, column 4, lines 39-43) – claim 9
- x. An acceleration system (“JEOL Model 6400”) providing a low acceleration voltage (column 9, lines 20-25) – claim 11
- xi. A computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) adapted to control the second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) – claim 10, 12.
- xii. The gas delivery system (34; column 5, lines 22-38) is also adapted to “dispense a carrier gas towards said opaque defect”, “said gas comprises water or oxygen” (claim 29), “said gas comprises Xenon Fluoride (XeF<sub>2</sub>)” (claim 30) – Applicant’s claim 18, 29, 30 limitations are intended use claim requirements. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).
- xiii. Applicant’s claim 20 limitation of “the reactant gas absorbs to said opaque defect and becomes disassociated” are intended use claim requirements. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention

generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Casey does not teach that Casey's first electron column (28; Figure 1; column 3, lines 8-16, "image and mill the workpiece"; column 4, lines 5-10; column 5, lines 5-10) is used to direct a first set of electrons towards a substrate.

Casey does not teach that Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) is capable of "scanning".

Casey does not teach Casey's computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) adapted to control the second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) can control Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) "dwell time", "scan rate", "refresh time", and "retrace time" because Casey does not teach that Casey's second electron column<sup>1</sup> delivery system (32, 54, 56, 62, 64, 52/112; column 4, line 64 – column 5, line 12; column 5, line 63 - column 6, line 10) is capable of "scanning". However, Casey's computer controller (50, 52/112, column 4, lines 38-45; column 7, lines 33-44; column 5, line 63 - column 6, line 10; column 7, lines 32-44) is inherently

capable of controlling “dwell time”, “scan rate”, “refresh time”, and “retrace time” as evidenced from Casey’s “scan generator element 62”, “dwell registers 64” (column 4, line 40; column 7, line 55 – column 8, line 5), and processor 52/112 “to implement a digital raster pattern” (column 5, line 65). Applicant’s claimed “times” and “rates” of moving are translated to Casey’s control element 58 to generate raster motions which have “dwell time”, “scan rate”, “refresh time”, and “retrace time” based on the desired milling instructions (column 6, lines 1-10; column 7, lines 45-54).

Parker teaches a “highly focused” scanning (“ion beam is scanned”; claim 1, ) electron column (4; Figure 1A; column 4; lines 13-23) used to direct a first set of electrons (10; Figure 1A; column 4; lines 13-23) towards a substrate (“targets”; column 2, lines ) for charge neutralization (claim 1, “second, charge neutralization mode”).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Parker’s electron column to Casey’s apparatus and to optimize the operation of Casey’s apparatus to avoid damaging underlying layers of the processed substrate.

Motivation to add Parker’s electron column to Casey’s apparatus and to optimize the operation of Casey’s apparatus to avoid damaging underlying layers of the processed substrate is to minimize substrate damage as taught by Casey (column 9; lines 65-67) and for combining multiple beam sources into one apparatus as taught by Parker (column 3; lines 29-31) to image “with high spatial resolution” as taught by Parker (column 3; lines 33-35). Further, it is well established that the duplication of parts is obvious (*In re Harza* , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (*In re Boesch*, 617 F.2d 272, 205 USPQ 215

(CCPA 1980); *In re Hoeschele* , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc . v. Biocraft Laboratories Inc. ,* 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); *In re Kulling ,* 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

6. Claims 21-24, 26, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Casey, Jr. et al (USPat. 6,042,738) as demonstrated by Baum, Aaron Wolf et al (US 5,684,360 A) and Fuji, Eiji et al (US 5,876,504 A) in view of Parker; Norman W. et al. (US 4,818,872 A). Casey, Parker, and Fuji are discussed above. Casey, Parker, and Fuji do not teach operating pressures in 0.5-10.0mTorr, “a beam comprising a current of about 0.05-1.0nA”, second electrons beams with diameters of about 5-125nm and energies of 0.-3.0keV. Casey further does not teach that his reactor is either reaction-limited or mass transfer limited as claimed by Applicant’s claim 33 – However, when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (*In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Parker further teaches an electron beam apparatus (Figure 7) including operating pressures up to 100picoTorr (column 6, lines 15-20), beam currents of about 1.0nA (column 7, lines 1-10), electrons beams with diameters of about 5-125nm (“not more than 1 micrometer”; column 7, lines 1-10) and energies of 3.0keV (column 7, lines 23-31).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Casey’s electron emitting column with Parker’s electron emitting column (12; Figure 7).

Motivation to replace Casey's electron emitting column with Parker's electron emitting column (12; Figure 7) is for thin film processing as taught by Parker (column 6, lines 30-41).

***Response to Arguments***

7. Applicant's arguments with respect to claims 1, 4-12, and 18-33 have been considered but are moot in view of the new grounds of rejection.

8. Applicant's arguments filed November 15, 2007 have been fully considered but they are not persuasive.

9. Applicant states

“

Despite the assertions of the Examiner, the apparatus taught by the three cited references are not compatible. No motivation to combine has been shown in the references themselves by the Examiner. Therefore, it is improper for the Examiner to use hindsight to combine the apparatus taught by the three cited references.

“

10. In response to applicant's argument that is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, all of the cited references are each in the field of Applicant's endeavor as outlined in the Examiner's rejection of the claims.

11. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the

teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Motivation to add Parker's electron column to Casey's apparatus and to optimize the operation of Casey's apparatus to avoid damaging underlying layers of the processed substrate is to minimize substrate damage as taught by Casey (column 9; lines 65-67) and for combining multiple beam sources into one apparatus as taught by Parker (column 3; lines 29-31) to image "with high spatial resolution" as taught by Parker (column 3; lines 33-35). Further, it is well established that the duplication of parts is obvious (*In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

12. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant states:

“

Applicants wish to bring to the attention of the Examiner that the electrons in Applicants' claimed invention are not used for imaging and are not used for etching.

“

13. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., “the electrons in Applicants' claimed invention are not used for imaging and are not used for etching”) are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, the Examiner disagrees. Applicant's electron scanning delivery system “images” the claimed opaque defect as per the SEM described in section [0027].

14. Applicant states:

“

Applicants wish to bring to the attention of the Examiner that the electrons in Applicants' claimed invention are not used to mill the workpiece, whether precisely or otherwise.

“

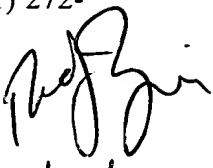
In response, the Examiner notes that Applicant's arguments are based on Baum's teaching of the art-accepted definition of “electron beam column” (column 6, lines 30-35).

*Conclusion*

15. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

  
1/20/8